

089498-0467

Express Mail No. ER963339276

CLAIMS

What is claimed is:

1. A compound having the formula:



2. A method for manufacturing 7-ethynyl-2,4,9-trithiaadamantane comprising the step of:
- reacting 7-carbonyl-2,4,9-trithiaadamantane with Ohira-Bestmann reagent to produce 7-ethynyl-2,4,9-trithiaadamantane.
3. The method of claim 2, further comprising the step of reducing an alkyl 2,4,9-trithiaadamantane-7-carboxylate by reacting the alkyl 2,4,9-trithiaadamantane-7-carboxylate with diisobutylaluminum hydride, sodium tetrahydridoborate, lithium aluminum hydride, or a combination thereof.
4. The method of claim 3, wherein diisobutylaluminum hydride, sodium tetrahydridoborate, lithium aluminum hydride, or a combination thereof is reacted with the alkyl 2,4,9-trithiaadamantane-7-carboxylate in a relative mole ratio ranging from about 1:1 to about 5:1.
5. The method of claim 3, wherein the alkyl 2,4,9-trithiaadamantane-7-carboxylate is methyl 2,4,9-trithiaadamantane-7-carboxylate.

089498-0467

Express Mail No. ER963339276

6. The method of claim 2, further comprising the step of oxidizing 7-hydroxymethyl-2,4,9-trithiaadamantane under Swern oxidation conditions.

7. The method of claim 2, wherein the Ohira-Bestmann reagent is a combination of X and Y;

wherein X is $\text{COCH}_3\text{C}(\text{N}_2)\text{P}(\text{O})(\text{OCH}_3)_2$, $\text{COCH}_3\text{C}(\text{N}_2)\text{P}(\text{O})(\text{OCH}_2\text{CH}_3)_2$, or a combination thereof; and

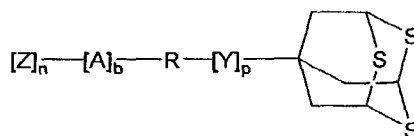
wherein Y is K_2CO_3 , Na_2CO_3 , or a combination thereof.

8. The method of claim 2, wherein the Ohira-Bestmann reagent is reacted with 7-carbonyl-2,4,9-trithiaadamantane in a relative mole ratio ranging from about 1:1 to about 5:1.

9. The method of claim 6, wherein the Swern oxidation conditions comprise a mixture selected from the group consisting of a mixture having oxalyl chloride and dimethyl sulfoxide; a mixture having trifluoroacetic anhydride and dimethylsulfoxide; a mixture having triethylamine and diisopropylamine; and combinations thereof.

10. A molecular wire composition comprising a molecular wire having a trithiaadamantane surface anchor.

11. A molecular wire having the formula:



wherein A and Y are independently selected chemical functionalities;

wherein p is 0 or 1;

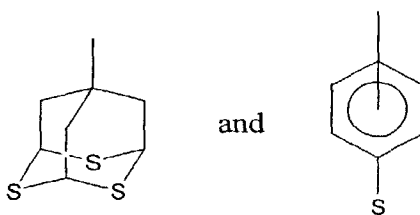
wherein b is 0 or an integer greater than or equal to 1;

wherein R is a compound that is capable of transferring a signal;

wherein Z is a surface anchor; and

wherein n is 0 or an integer greater than or equal to 1.

- 5 12. The molecular wire of claim 11, wherein Z is selected from the group consisting of:



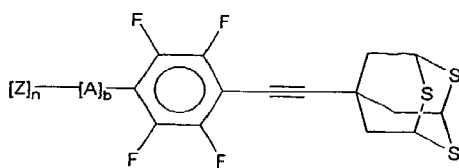
13. The molecular wire of claim 11 wherein A and Y are independently selected from the group consisting of ethynyl and carboxylate.

- 10 14. The molecular wire of claim 11, wherein the wire is selected from the group consisting of:

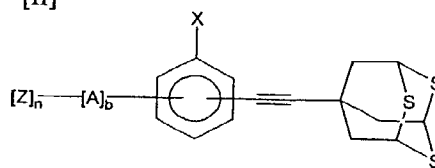
089498-0467

Express Mail No. ER963339276

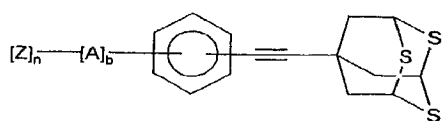
[I]



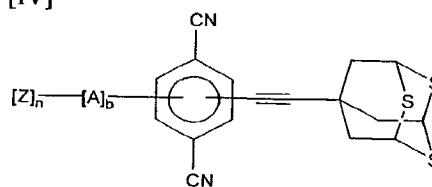
[II]



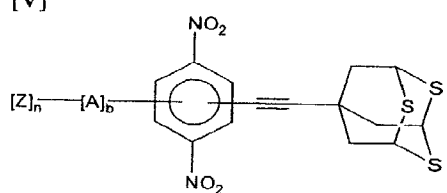
[III]



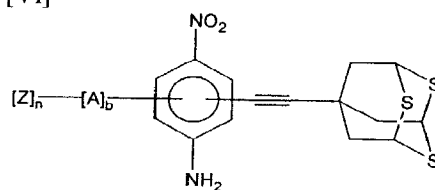
[IV]



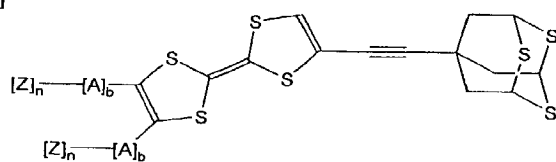
[V]



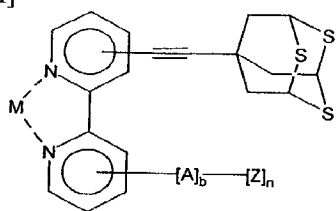
[VI]



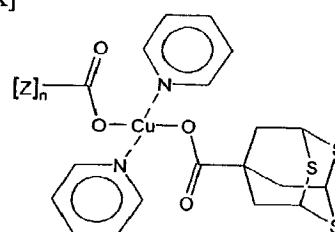
[VII]



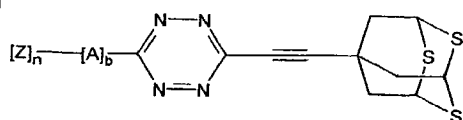
[VIII]



[IX]

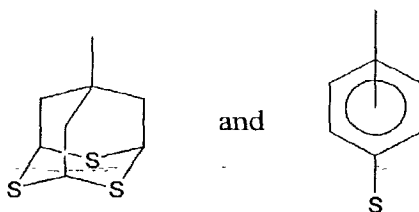


[X]



wherein A is a chemical functionality;
wherein b is 0 or an integer greater than or equal to 1;
wherein Z is a surface anchor;
wherein n is 0 or an integer greater than or equal to 1;
5 wherein M is a metallic element; and
wherein X is a halogen.

15. The molecular wire of claim 14, wherein M is selected from the group consisting of platinum, palladium, and copper.
- 10 16. The molecular wire of claim 14, wherein X is selected from the group consisting of fluorine, chlorine, bromine, and iodine.
17. The molecular wire of claim 14, wherein Z is selected from the group consisting of:



- 15 18. The molecular wire of claim 14, wherein A is ethynyl or ester.
19. A method for manufacturing a molecular wire comprising the step of chemically bonding, either directly or indirectly, trithiaadamantane to a compound that is
- 20 20. The method of claim 19, wherein the signal is electronic.
21. A molecular wire produced by the method of claim 19.

089498-0467

Express Mail No. ER963339276

22. A method for manufacturing 7-ethynyl-2,4,9-trithiaadamantane comprising the step of:

reducing an alkyl 2,4,9-trithiaadamantane-7-carboxylate to produce 7-hydroxymethyl-2,4,9-trithiaadamantane; and

5 oxidizing 7-hydroxymethyl-2,4,9-trithiaadamantane to produce 7-carbonyl-2,4,9-trithiaadamantane.

23. A composition comprising:

10 a molecular wire having a trithiaadamantane surface anchor, wherein the molecular wire also has an insulation coating.

24. The composition of claim 23, wherein the insulation coating is β -cyclodextrin.